NASA
Glenn
Success
Stories

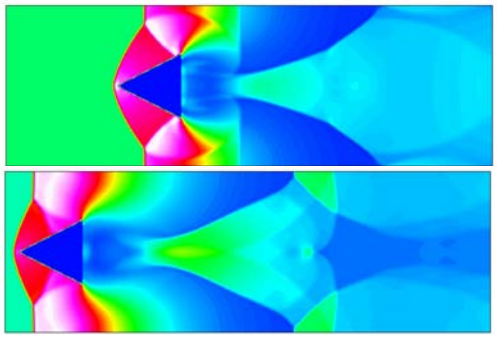
LSTC Incorporates NASA Glenn Software Into Its Flagship Product

TECHNOLOGY

The Space-Time Conservation Element and Solution Element (CE/SE) method is a numerical framework for solving conservation laws in continuum mechanics. This computational fluid dynamic approach simulates systems where entities with steep gradients co-exist with weak waves.

COMMERCIAL APPLICATION

Livermore Software Technology Corporation (LSTC) develops LS-DYNA, a general purpose transient dynamic finite element program capable of simulating complex real world problems. LS-DYNA boasts an array of engineering applications, including collision testing for vehicle design analysis and stress and deformation prediction in sheet metal forming.



These images depict the flow patterns of the interaction of a fluid with a structure at two moments in time. The structure is a rigid wedge and the fluid contains a moving shock wave. Here the wedge moves in the opposite direction to the shock wave. The data that generated these illustrations was computed using CE/SE.

LSTC learned of the potential of NASA Glenn's CE/SE software in 2001. CE/SE's innovative approach and capabilities greatly impressed LSTC, who contacted the software's author, a NASA Glenn researcher. Together, LSTC and NASA Glenn recognized that there were significant opportunities for CE/SE to enhance LSTC's product line.

SOCIAL/ECONOMIC BENEFIT

LSTC integrated the CE/SE method into the LS-DYNA product, the new version tapping the strengths of the CE/SE method in its fluid solver. This new fluid solver has passed some important quality assurance tests, and several LS-DYNA users have already shown interest in it. Current and potential tests include aircraft and automotive noise studies. The new, more robust LS-DYNA version, incorporating a CE/SE solver, is slated for formal release in mid-2005.

NASA APPLICATIONS

NASA Glenn researches the problem of excessive noise as a by-product of jet propulsion. NASA developed CE/SE to examine this and other aeroacoustic problems, such as turbo machinery noise and acoustic disturbance in hyper sonic test facilities, in order to model new designs that would diminish the shock wave generation. The CE/SE method resolves strong gradient phenomena while capturing weak waves. This makes the code widely applicable to all flow induced noise problems.

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